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ABSTRACT

Three telecourse programs offering high school credit courses via interactive satellite communication are described and evaluated. German by Satellite and Physics by Satellite from Oklahoma State University feature biweekly 40-minute broadcasts with audio interaction via regular telephone lines and microcomputer voice recognition software at subscribing schools. Accelerated Learning of Spanish Project Via Satellite, sponsored by the Utah State Board of Education, offers first-year Spanish in 40-minute biweekly broadcasts with computerized voice synthesis and other media at subscribing schools. Broadcasts are videotaped and do not include audio talk-back components. The TI-IN Network Incorporated is the most widely distributed and fastest growing of the satellite systems. It transmits 20 different high school courses in daily live broadcasts using the teacher-present/student-recite method with audio interaction via telephone. The three programs offer exposure to learning experiences and technology not available in the subscribing schools, promote independent study skills, and present excellent instruction and materials. Weaknesses include communication difficulties between schools and program suppliers, lack of inservice training in two of the programs, and remote site equipment problems. Equalization of access to educational resources is the major advantage of instruction by satellite. Addresses of described programs and one new program are included. (LFL)

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INTERACTIVE SATELLITE INSTRUCTION: HOW CAN RURAL SCHOOLS BENEFIT

A Paper Presented at the
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INTERACTIVE SATELLITE INSTRUCTION: HOW CAN RURAL SCHOOLS BENEFIT

Distance learning--that is, the transmission of a master teacher's lessons from a host site to previously identified receive sites simultaneously by means of telecommunications is an educational innovation that is sweeping this country. Within the past 24 months, three separate vendors in the continental United States have pioneered the concept of interactive satellite instruction of high school courses. These include: (1) German by Satellite and Physics by Satellite, offered by the College of Arts and Sciences at Oklahoma State University; (2) the Accelerated Learning of Spanish Project Via Satellite Television sponsored by the Utah State Board of Education, the Bonneville International Corporation, and the IBM Corporation; and (3) the TI-IN Network broadcasting 14 different high school courses during the 1985-86 school year, originating from San Antonio, Texas.

The delivery of live, televised courses to remote sites coupled with audio talk-back and other media components holds great promise as a vehicle to increase curricular offerings in small/rural high schools. Due to the recent advent of this educational alternative, however, information on its advantages and/or drawbacks is limited. To date, no formal studies to evaluate any of these three educational delivery systems have appeared in the professional literature. Between them, these satellite networks beamed 16 different high school credit courses to over 2300 students in approximately 200 schools scattered across 13 states during the 1985-86 school year (Barker, 1986). Each network is experiencing rapid growth.

The purpose of this paper is to (1) provide a brief program description of each of the three systems; (2) report on formal research findings which address the effectiveness of high school courses taught via satellite technology; and (3)

identify some of the strengths and/or weaknesses associated with TV teaching via satellite.

Interactive Satellite Program Descriptions

The individual program descriptions provided herein are brief. Readers desiring more detailed information should contact the vendor(s) directly. Addresses and telephone numbers for each vendor appear in the Appendix of this paper.

Satellite Courses from Oklahoma State University

During the spring semester of the 1984-85 school year, Beaver High School, located in the Panhandle of Western Oklahoma, began offering German language over satellite which was beamed from Oklahoma State University. Less than one year later, over 50 other high schools in the state had joined the network which served more than 700 students at the close of the 1985-86 academic year (Joggerst, 1986). Within one year the offering of German language in Oklahoma high schools had doubled.

For the 1986-87 school year, OSU has added second-year German to their curriculum as well as high school physics. In addition, program administrators anticipate expansion of the network into at least 15 more states. Before the end of this decade, OSU plans to develop and broadcast accredited high school courses in calculus, chemistry, Russian, and Japanese ("German by Satellite," 1986).

The Oklahoma system incorporates a blend of teaching and technologies which was devised by Dr. Harry Wohlert, a professor of German at OSU and instructor of the German satellite course. Two days a week (Monday and Wednesday) students watch their teacher over a regular TV monitor which receives the satellite signal either by means of the school's downlink dish or by cable as the signal

is redistributed from another dish. Live audio interaction between teacher and students is possible via an audio link over regular telephone lines. On the other three days of the week, students study at their own schools under the supervision of a regular classroom teacher who monitors individualized study by students who are using headphones and a voice recognition computer software unit which operates on either Apple IIe or Radio Shack III/IV microcomputers. OSU recommends a ratio of two to three students for each computer.

The base monetary cost for schools to participate on the Oklahoma Network is $1,750 each for any one of the three courses. Schools with satellite classes of over 10 students are assessed an additional $50 per pupil to pay for costs of additional paper and lesson grading. Lessons are sent via the postal service. Subscribing schools are responsible to buy their own satellite dish, microcomputers, and tape recorders. Depending on type and quality of hardware equipment purchased, up-front outlay may range from $5,000 to $10,000. The University supplies two 45 minute interactive broadcasts each week (60 telecasts during the year) with rights for off-the-air videotaping, computer software for voice synthesis, cassette tapes, and print materials.

Distance Accelerated Learning--Utah

The Accelerated Learning of Spanish Via Satellite Television Project is jointly sponsored by the Utah State Board of Education, Bonneville International Corporation which is a private satellite corporation, and the IBM Corporation. At the close of the 1985-86 school year, 27 schools and 840 students, scattered across Utah, Colorado, Nevada, and Arkansas had participated in the program's first year of operation (Ives, 1986). Instructional content for the course has been designed for students at both the junior high and high school level who are studying first-year Spanish. The 1986-87 school year will see no new courses

added to the system's curriculum, however, plans are being considered to include Spanish II, English as a second language, and other courses in the future.

The Utah Spanish project is somewhat similar to the German program in Oklahoma. Both utilize televised satellite broadcasts, computerized voice synthesis, and other media in the instructional process. Similar to Oklahoma, over the course of a year, Utah beams a 40-minute telecast every other day. On the non-broadcast days, students work under the direction of a classroom facilitator either individually on computer software programs or in group activities which have been developed specifically for the course. Yet, there are significant differences between the two programs. Most notable is that the Utah program broadcasts previously taped video lessons--not live instruction. Furthermore, the satellite broadcasts do not include an audio talk-back component for students. Broadcasts are a one-way video and one-way audio signal only. In truth, the system does not permit live interaction between students and the TV satellite teacher.

Costs of the Utah program are higher than those for Oklahoma. Schools who join the network are required to obtain their own satellite receiver, a television monitor (the recommendation is one monitor for every 10 students), one IBM PC Junior computer to be shared between every two students, one IBM XT computer and appropriate software for networking among the computers. The total estimated cost for equipment to accommodate 10 students is about $18,500. The subscription fee for 1986-87 is $1,600 plus either a $15 charge per student for printed materials or $100 for camera-ready copies which can be duplicated by the school. The $1600 fee provides the school with 80 televised satellite broadcasts and permission to videotape off-the-air, 80 computer programs, teacher materials, enrichment activities for students, and inservice training for

classroom facilitators.

The TI-IN Network--Texas

The TI-IN Network Incorporated is a Houston based firm which over a year ago received approval from the Texas Education Agency to begin the broadcast of interactive satellite programs in Texas. It has since become the most widely distributed and the fastest growing of the three satellite systems. TI-IN initially began as the Texas Interactive Instructional Network. The network quickly dropped the Texas title to avoid the connotation that it was restricted to the Lone Star state. When first beginning broadcasts in September 1985, TI-IN reported 53 downlink sites in Texas. One is in Dallas which redistributes to 36 other sites via low frequency TV signals (Instructional Television Fixed Services). Another downlink site is in California which redistributes to 18 schools over ITFS (Tinsley, 1986). Since September of 1986, the network has beamed 20 different high school courses to schools in six different states, with schools in many other states expressing interest.

TI-IN's satellite instruction operates somewhat differently than either the Oklahoma or the Utah systems. Among the most notable differences is that TI-IN offers a much broader curriculum--Calculus, Pre-Calculus, Latin I, Computer Science I, Personal Business Management, Business and Consumer Law, Psychology, U. S. Goverment, Computer Math I, Spanish I, English Honors, German I, Trigonometry, French I, etc. Furthermore, live broadcasts of these courses are telecast five days a week. TI-IN does not use computer assisted instruction or individualized learning modules as do the Utah and Oklahoma programs. Rather, TI-IN perpetuates the existing--and familiar--model of teacher-present/student-recite pattern of traditional classroom instruction. This, and the variety of courses available may be reasons why the network is growing so rapidly. Other

factors may be that TI-IN offers much more to subscribing schools that just accredited high school courses. Other offerings include a large array of enrichment programs for levels K through 12, extensive inservice training for teachers and administrators, staff development training, and test reviews for both teachers and students. The network is approved by the Texas Education Agency.

The first year costs for purchase of equipment, which includes subscription to the network, are about $15,000. Thereafter, the annual subscription fee for all high school courses is based on the number of students per school who register for satellite instruction. For each block of nine students, registering in any mix of the 20 courses offered, the fee is $3780. (Nix, 1984). Fees for inservice training, staff development, and test reviews are separate.

Evaluation of Interactive Satellite Instruction

Due to differences between the three satellite systems evaluative data about each will be reported separately in this paper.

German by Satellite--Oklahoma

In May of 1986, the Oklahoma State Department of Education collected survey information from 30 high schools which had participated in the German by Satellite program during its first full year of operation (Barker and Garrett, 1986). The schools in the sample reported a total enrollment of 244 students participating in the German course of which 236 received credit. The mean student enrollment per school was eight pupils.

According to building principals, the greatest strengths of this delivery system, in descending order, were:

1. The opportunity it provided students to study a foreign language which

would otherwise not have been provided.

2. Students received a cultural learning experience as well as exposure to a foreign language.
3. Students in smaller schools were exposed to the use of technology.
4. It promoted self-motivation for students and helped instill habits in independent study.
5. The level of instruction and quality of materials were excellent.

Based on principals' opinions, the following were identified as the major weaknesses of the system (presented in descending order):

1. The broadcast time of the satellite class was not synchronized with the school's bell schedule.
2. Live broadcasts needed to be increased from two broadcasts per week to three in order to
   a. maintain student interest and motivation;
   b. provide students with more subject matter background; and,
   c. increase interaction between students and the TV teacher.
3. The "turn-around" time between testing and reporting scores to students was too long.
4. Absence of a real "teacher in the classroom" was a concern.

The majority of principals (80 percent) were not pleased with the communication that existed between their schools and Oklahoma State University. Among the complaints reported were that phone calls were not always returned and some promised materials were not sent. Eighty percent of the administrators felt that inservice training for administrators was essential in order to learn how the network operates and how students are to interact. In addition, 97 percent felt that the classroom facilitator should definitely receive inservice

training on the system.

Regarding the use of computer equipment supporting the course, several principals indicated that the voice recognition unit was difficult to adjust properly and was inconsistent in providing feedback. Consequently, some students hesitated to use it. Principals also reported that many students needed help to correctly use the voice recognition equipment.

Finally, 53 percent of the principals stated that they had altered the grading scale used by the TV instructor. This was done chiefly to accommodate local conditions/policy at the school.

Distance Accelerated Learning--Utah

This paper does not report a formal evaluation of the Accelerated Learning of Spanish project originating from Utah. Nevertheless, some observations are in order.

During the 1985-86 academic year, school principals in several Utah and Nevada high schools participating with the Spanish satellite project were contacted by telephone. In addition survey data was received from approximately 40 students (Barker, 1986). The overwhelming attitude of both principals and students was that learning by satellite had been a meaningful experience. Individual comments emphasized the positive qualities of the TV teacher, the value of student/computer interaction, and the fact that small remote school districts were able to provide students in their schools with increased opportunities for learning. Many students reported that the manner in which the class was taught made it fun, interesting, and a quality learning experience. Suggestions for improvement centered on the need for more class offerings besides just Spanish language, as well as the need to increase opportunities for student talk-back to the TV teacher.

It should be noted that in 1985-86, Utah's first full year of the Satellite Spanish project, the TV teaching was broadcast live and included audio-talkback capabilities between the TV teacher and receive site schools. Yet, in 1986-87, they have discontinued the talk-back component and no longer broadcast live over the satellite. Instead, they broadcast previously recorded ("canned") videotapes over the satellite network and have discontinued the opportunity for teacher/student interaction. In the opinion of the researchers, this is a mistake. Administrators of the Utah project have lost sight of the real advantage of teaching via satellite--that is, live teacher/student interaction. No matter how well produced the videotaped lessons may be, lack of a teacher whom students can question, for clarification and explanation during instructional time greatly reduces the effectiveness of the teaching approach. Another concern is the fact that videotaped lessons are delivered via the expensive medium of satellite technology. Why not simply make copies of the tapes and send them to participating schools for a fee? School principals who are thinking of joining the Utah network would be ill advised to spend the money for an expensive satellite receive dish only to receive a series of previously recorded videotapes. Principals who have already purchased a downlink dish might give a serious look to other satellite vendors where they might receive more use from their investment. This is not to criticize the lesson content of the Spanish program. On the contrary, Utah's philosophy of the "distance accelerated learning" is to provide a structured multi-sensory approach to education. For example, lessons begin with relaxation exercises intended to stimulate the students' left and right brain hemispherisic processes, followed by a warm up period in which content is introduced using advanced organizers to help students understand the purposes of the lesson and how they can best benefit from the instruction.

Satellite broadcasts include planned strategies for "active" as well as "passive" listening. Active listening requests that the students read out loud the Spanish dialogue along with their TV teacher. Passive listening asks that they form in their minds the words as they listen to music or watch scripted dialogue. Classroom practice (non-broadcast days) is very involved with students completing computer assisted lesson activities on IBM PC juniors and XT computers which include voice synthesis modules. Games, choral recitation and singing, group and paired study, and oral questioning also promote student interaction in the subject area. An instructional design team of 25 professionals has worked together to design and produce Utah's accelerated Spanish program. The program permits and encourages a great deal of student interaction with the computer, other mediated materials, and other students. Yet, it lacks interaction with the most important link in the learning process--the expert teacher.

The TI-IN Network--Texas

During the Spring of 1986, a 20-item questionnaire was administered via telephone to high school principals in 30 different subscribing schools participating on the TI-IN Network. In addition, a 25-item self-administered questionnaire was prepared and copies were mailed to the same 30 subscribing schools and were completed by students who were taking coursework via satellite. Usable responses were received from 159 students (Barker, 1986).

The Statistical Analysis System (SAS) computer program for the social sciences was used to list the frequency distributions; and to calculate the mean, standard deviation, and range for each of the variables taken from the two questionnaires.

The mean ADA (average daily attendance) reported per high school participating

in the study sample was 239. In each school the average number of students enrolled in satellite classes was between eight and nine. Most students (85 percent) were enrolled in only one satellite course, however 14 percent were enrolled in two courses and one percent were enrolled in three different courses. Eight-one percent of the principals stated that satellite courses had become an integral part of their school's curricula. The others were investigating the system on a pilot basis. Still, all but one principal indicated they were planning to re-subscribe to the system the following year. Courses in which the highest number of students were enrolled included Spanish, computer science, basic math skills, German, basic English skills, British literature, psychology and sociology.

In 80 percent of the schools, principals indicated that student enrollment in satellite courses was reserved for "A" and "B" students. In the other 20 percent of the schools, enrollment was open to all students. Although student participation was across the spectrum of grades 9 through 12, most participating students were seniors (44 percent), followed about evenly by juniors (25 percent), and sophomores (22 percent). Only nine percent of participating students were freshmen.

One of the interesting findings from the survey was the level of reported interaction between students and their TV teacher. On a five point attitude scale ("poor, fair, good, very good, excellent"), 32 percent of the principals rated student/teacher interaction as "excellent" and 45 percent rated it "very good." No principals reported the level of interaction to be "poor;" 10 percent said it was "fair;" and 13 percent reported it to be "good." In addition, on an average, each student reported that two to three telephone calls were initiated by them each week to their TV teacher during the lesson broadcasts. Also, between

two to three times each week the TV instructor called them by name, over-the-air, and asked for their response to specific aspects of the lesson.

An associated finding was the level of student preceived difficulty for satellite courses. Although 24 percent of the students stated satellite courses were about the same as regular classes in terms of difficulty, 65 percent said they were harder. Similar findings were reported in terms of homework assignments and exams and quizzes. In fact, when asked if they preferred satellite instruction over regular classroom teaching, almost 70 percent of the students said they would opt for the regular classroom. School principals were favorably impressed with the quality of student learning achieved in satellite courses. Twenty-six percent rated it "good," 61 percent, "very good," and 13 percent, "excellent." No principal rated quality of learning as either "fair" or "poor."

In descending order of frequency reported, the major strengths of satellite teaching as noted by students were: (1) the variety of classes available which otherwise would not have been offered at the school; (2) personality of the TV teacher; and (3) the instruction was interesting and varied. Among the least liked aspects of satellite teaching were: (1) too much work was required and it was too difficult; (2) communication over the telephone made hearing difficult; (3) it was often hard to get hold of the TV teacher by telephone during the lesson broadcast; (4) the contact between the teacher and classmates in other locations seemed too impersonal; and (5) some TV teachers were poorly prepared or lacked ability to teach via the TV.

Student recommendations to improve the system included: (1) improve the audio quality and efficiency of telephone calling from the receive site schools; (2) get a bigger TV screen in the schools so that students can see easier; (3) keep the receive site equipment in proper repair so that students don't get

behind on lesson broadcasts; and (4) get better teachers to teach over TV. Principals were overall very favorable in their view that satellite courses were a definite benefit to their respective instructional programs. The vast majority felt that the monetary outlay for equipment and subscription fees was well worth the money.

Conclusion

Though not a panacea, the delivery of instruction via satellite has tremendous potential to positively impact education. For small and rural schools particularly, satellite instruction equalizes access to educational resources by overcoming barriers of distance and geographical isolation. Undoubtedly this approach will receive increased attention and interest from the education community. In the process, certain issues must be addressed. These include, but are not limited to, the following:

1. Certification of satellite teachers across state boundaries. Do Texas, Utah, or Oklahoma State certified teachers need multiple state certification when beaming instruction to schools outside their respective state boundaries?
2. State adopted curricula. Is it appropriate that Texas Essential Elements (state adopted curricula) be imposed upon subscribing satellite schools in Arkansas, Kansas, Iowa, or elsewhere?
3. Class size. How interactive can students really be with their teacher and classmates in other locations if satellite classes are as large as 700 students, the size reported for OSU's German by Satellite class in 1985-86 (Brown, 1985)?
4. TV reception quality. Downlink reception of the satellite signal can be over either a KU band or C band signal. Each has definite advantages

and disadvantages. Potential subscribers need to be aware of the signal best received in their area.

5. Censorship. Students left unattended in a receive site classroom could, as happened in one Texas classroom (Brown, 1985), broadcast an obscene telephone call across the airwaves to all other schools on the network. How can this be controlled?
6. Employment outlook. Is teaching via satellite an answer to the impending teacher shortage? Is satellite instruction a threat to replacing the classroom teacher?

School administrators who are considering investment in a satellite instructional network are advised to give thought to these questions. Furthermore, before making any decision to join a network, they should (1) determine their school's instructional needs and (2) contact the various vendors to see how those needs can best be met and at what cost. In 1985-86, three vendors (those discussed in this paper) in the continental United States were beaming high school credit courses over satellite. In 1986-87, a new vendor entered the airwaves--the Telecommunications Project jointly sponsored by Education Service District 101 in Spokane, Washington, and East Washington University. Beginning in the Fall of this year interactive satellite broadcasts were begun for high school courses in Spanish, Japanese, advanced English and advanced math. We can expect other vendors to enter this market in the future.

In most cases, small and rural schools are simply unable to offer the same range of courses and services as bigger schools in suburban and metropolitan areas. Interactive satellite instruction is not necessarily the answer to solve this dilemma, but it is one very viable answer. In the past, rural educators have relied on correspondence courses, traveling teachers, pairing agreements,

telephone conferencing, and other alternatives to provide rural youth with a full range of curriculum offerings. Educators in small and rural communities now have the added alternative of interactive satellite learning. Live, full motion video, with audio talk-back, coupled with electronic mail and microcomputer learning is an exciting consideration for any small school faced with the challenge of expanding or improving its curriculum. We are not talking about the future. The technology is now available as is hardware and selected software. The future is here. Educational administrators in small and rural schools should make efforts to maintain an awareness of innovations and advancing technologies that can positively impact student learning in their schools. The truth is, if many students in small and rural high schools are going to get the courses they need, they are going to have to get them by long distance.

References

Barker, B. O. 1986, July. Live via satellite: Interactive distance learning in America's rural schools. Address delivered at the Sixth Annual Colorado Rural and Small Schools Conference, Fort Collins, Colorado.

Barker, B. O. and Garrett S. 1986. German by satellite: A foreign language alternative for small high schools. The Rural Educator (in press).

Brown, F. C. 1985. Televised classes help rural high schools offer fuller, more demanding curricula. The Wall Street Journal, November 12, page 31.

Distance learning seen sweeping country. 1986, April/May. School Tech News, 3 (7), 1, 5.

German by satellite. 1986, January/February. Teleconference, 5 (1), 21-22.

Ives, R. 1986, July. Distance accelerated learning of Spanish project. Notes taken from presentation at the Sixth Annual Colorado Rural and Small Schools Conference, Fort Collins, Colorado.

Joggerst, J. 1986, March. Satellite scholastics. Satellite Orbit, 31-35.

Nix, S. 1984, October. Texas interactive instructional network: Projected school district costs, 1985-86. Paper presented at the Fifth Annual Conference for Educators of Community Schools, Lubbock, Texas.

Tinsley, P. 1985. "Satellite Delivered Instruction: TI-IN to a classroom without walls." Presentation at the Technology-Based Curriculum Systems Conference, Dallas, Texas, October 21-23. Sponsored by the Southwest Educational Regional Development Laboratory.

APPENDIX

Note: Readers desiring additional information about the programs mentioned in this paper should contact:

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